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Assistant Commissioner of Patents  
Box Patent Application  
Washington, DC 20231

Sir:

Transmitted herewith for filing is the patent application of:

Inventor(s) : Roy Studebaker  
For : SPRAYLESS SURFACE CLEANER

Enclosed are:

- [X] 4 sheet(s) of informal drawing(s). Figures 1 to 10  
[X] Small entity status under 37 C.F.R. 1.9 and 37 C.F.R. 1.27 is claimed.  
[X] The filing fee has been calculated as shown below.

				<u>Small Entity</u>	
<u>For:</u>	<u>No. Filed</u>	<u>No. Extra</u>	<u>Rate</u>	<u>Fee</u>	
<u>Utility Fee</u>					<u>\$380</u>
<u>Total Claims</u>	6	0	x 9	<u>\$380.00</u>	
<u>Independent Claims</u>	3	0	x 39\$	<u>0</u>	
( > ) Multiple Dependent <u>Claim Presented</u>		>	x 130\$		
<b>TOTAL</b>				<u><b>\$380.00</b></u>	

[X] A check in the amount of \$380.00 is enclosed.

**ASSIGNMENT**

(see assignment cover letter)

**AGREEMENT (See Recordation Cover sheet enclosed)**

[X] The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 07-1900. A duplicate copy of this sheet is enclosed.

[X] Any additional filing fees required under 37 C.F.R. 1.16.

[X] Any patent application processing fees under 37 C.F.R. 1.17.

Respectfully submitted,

Robert A. Jensen

Robert A. Jensen, Reg. No. 24,268

RAJ:pmv

Enclosures: Application, Claims, 4 Sheets of Informal Drawings  
Declaration, Verified Statement, Check, Postcard

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant or Patentee: Roy Studebaker

Serial or Patent No.: \_\_\_\_\_

Filed or Issued: \_\_\_\_\_

For: SPRAYLESS SURFACE CLEANER

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37  
C.F.R. §§1.9(f) AND 1.27(c)) -- SMALL BUSINESS CONCERN

I declare that I am:

[ ] the owner of the small business concern  
identified below.

[ X ] an official of the small concern empowered to  
act on behalf of the concern identified below.

NAME OF CONCERN HydraMaster Corporation

ADDRESS OF CONCERN 11015 47<sup>th</sup> Avenue West  
Mukilteo, WA 98275

I declare that the above-identified small business concern qualifies as a small business concern as defined in 13 C.F.R. §121.3-18 and reproduced in 37 C.F.R. §1.9(d) for purposes of paying reduced fees under 35 U.S.C. §41(a) and 41(b) in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I declare that rights under contract or law have been conveyed to and remain with the small business concern with regard to the invention entitled:

\_\_\_\_\_  
by inventor(s) \_\_\_\_\_

as described in:

03694 03693

[ x] the specification filed herewith.

[ ] application Serial No. \_\_\_\_\_, filed \_\_\_\_.

[ ] Patent No. \_\_\_\_\_, issued \_\_\_\_.

If the rights held by the small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below and no rights to the invention are held by any person, other than the inventor, who could not qualify as an independent inventor under 37 C.F.R. §1.9(c) or by any concern which would not qualify as a small business concern under 37 C.F.R. §1.9(d) or a nonprofit organization under 37 C.F.R. §1.9(e).\*

\*NOTE: Separate verified statements are required from each named person, concern and organization having rights to the invention averring to his/its status as a small entity. (37 C.F.R. §1.27)

FULL NAME

ADDRESS

[ ] individual

[ ] small business concern

[ ] nonprofit organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earlier of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 C.F.R. §1.28(b))

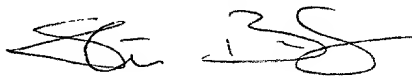
I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that the making of willfully false statements and the like is punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING Steve Brandt

TITLE OF PERSON OTHER THAN OWNER President

ADDRESS OF PERSON SIGNING 11015 47<sup>th</sup> Avenue West, Mukilteo, WA 98275

SIGNATURE



DATE

8/3/99

## Description

5

### SPRAYLESS SURFACE CLEANER

#### Technical Field

10 This invention relates to a tool for cleaning surfaces, and more particularly, to a tool for cleaning flooring surfaces, wall surfaces and upholstery. The tools utilize a cleaning fluid but do not include spray nozzles and therefore eliminate the problems associated therewith. The invention also relates to a method of delivering cleaning fluid to any one of a number of different tools. The cleaning  
15 fluid flows to the surface to be cleaned by traveling along the edge of the tool in a thin sheet, maintaining higher temperatures and allowing more complete recovery of the fluid and a reduced drying time.

#### Background of the Invention

20 Since the first installation of carpeting and upholstery, there have been innumerable ways and theories as to the best approach for keeping the carpeting and other fabric material clean, including wet versus dry cleaning, deep  
25 versus shallow cleaning, and invariably an equal number of instruments or tools to effect the cleaning process. The most commonly used cleaning method today is the process of applying cleaning fluid as a spray under pressure to the surface to both dissolve the dirt and stains and to scrub the fibers and  
30 simultaneously apply a vacuum or negative pressure to extract the cleaning fluid and the soil captured thereby. Although this relatively high pressure method is the method most commonly used, it has some disadvantages. First, it must be remembered that the very nature of the soiled surface defines  
35 that the majority of the soil will be at or near the surface of the fibers and, therefore, a high pressure cleaning tends to drive some of the surface soil and cleaning fluid deeper, thereby requiring a very powerful vacuum system to extract

those particles which have been driven beneath the outermost surface. Further, the use of cleaning fluid under pressure, applied through conventional jets, likewise drives the fluid itself deeper, and the fluid that is not immediately removed  
5 by the vacuum source takes a significantly longer amount of time to dry. Again, an inconvenience; but further, if the carpeting is used prior to the time it is completely dry, it is more likely to become soiled. Further, the sprayed fluid is atomized and comes into contact with the air, causing  
10 significant heat loss, diminishing the cleaning power of the fluid.

Numerous different approaches to spraying cleaning fluid under pressure and then removing it with a vacuum are illustrated in the prior art supplied herewith but will not be  
15 discussed in detail.

Another approach to the cleaning of carpeting and upholstery has been the use of a rotating device wherein the entire machine is transported over the carpeting while the cleaning head is rotated about a vertical axis. Typically,  
20 these machines include a plurality of arms, each of which includes one or more spray nozzles or a vacuum source providing a more intense scrubbing action since, in general, more scrubbing surfaces contact the carpet. These devices are primarily illustrated in the patents granted to Monson, and  
25 again, these devices are listed in the prior art known to the inventor but not discussed in detail herewith.

A third body of material wherein the cleaning fluid is either attempted to be deflected or otherwise controlled is illustrated hereinbelow.

30 U.S. Patent No. 4,137,600, granted to Albishausen on February 6, 1970, discloses a cleaning apparatus wherein the cleaning fluid is changed into a liquid curtain by a baffle within the cleaning head.

U.S. Patent No. 4,335,486, granted to Kochte on  
35 January 22, 1982, discloses a surface cleaning machine wherein the cleaning fluid is deposited upon the surface of the carpet pile from a wick like device which is wetted with the cleaning fluid.

030694-03049

U.S. Patent No. 4,649,594, granted to Grave on March 17, 1987, discloses a cleaning head wherein the cleaning solution is sprayed through a narrow passage and some is wicked along the surface of the passage.

U.S. Patent No. 5,157,805, granted to Pinter on October 27, 1992, discloses a method and apparatus for cleaning a carpet wherein the cleaning fluid is sprayed by nozzle against the back of a striker plate and then flows downwardly and through the carpet to a pickup vacuum.

U.S. Patent No. 5,561,884, granted to Nijland et al on October 8, 1996, discloses a suction attachment spray member wherein the fluid is sprayed against the distributor plate, which creates a planar diverging liquid jet substantially filling the vacuum chamber.

#### Disclosure of the Invention

The present invention in its broadest sense deals with the distribution of fluid to a surface for cleaning purposes. The fluid is distributed through a slot in a manifold which is in contact with the surface and the slot is effectively at an angle to the surface to be cleaned. The fluid is delivered in a thin film which because of fluidic attraction follows the contour of the edge of the slot, passing through the upper surface of the carpet or fiber being cleaned without having been formed into discrete particles as with spraying, thus maintaining a hotter liquid, and also allowing a more complete pickup and/or recycle of the fluid, since a greater portion moves directly to the vacuum return, reducing the amount of fluid left on the surface because of a lesser penetration, and thus reducing the subsequent drying time.

In addition to the above advantages, the current invention essentially eliminates the problem of overspray when the cleaning head is not immediately adjacent the surface to be cleaned.

With the above-noted prior art and objects in mind, it is an object of the present invention to provide a cleaning nozzle wherein the cleaning fluid is moved as a sheet along

the edge of the nozzle and distributed as a film through the upper portion of the material to be cleaned and is immediately removed along with the grime.

Another object of the present invention is to provide a cleaning bar which is moved over the upper surface of the material to be cleaned, the bar dispenses a cleaning fluid which penetrates the upper portion of the material dissolving the soil, which is then immediately vacuumed away, leaving a clean and substantially dry surface.

Still another object of the present invention is to provide a distribution manifold for cleaning fluid including a lower distribution surface and a distribution slot at an angle to the surface to be cleaned, allowing the fluid to flow over the edge of the slot and into the upper portion of the surface to be cleaned in a film.

Still a further object of the present invention is to provide a cleaning method wherein the cleaning fluid is distributed through a tubular member which is moved laterally across the surface to be cleaned, said tubular member having a longitudinal slot at an obtuse angle to the radius, allowing the fluid to be distributed as a film along the surface outside the slot and the surface to be cleaned.

Yet another object of the present invention is to provide a cleaning system having a cleaning fluid-applying device which substantially reduces the amount of fluid left on the cleaned surface while also substantially eliminating the problem of overspray.

Still a further object of the present invention is to delivery fluid to an adjacent surface in a thin, continuous film, controlling the amount of fluid and depth of penetration of the fluid.

#### Brief Description of the Drawings

Figure 1 is an environmental view showing a self-contained carpet cleaning apparatus, which is one type that could utilize the present invention.

Figure 2 is an isometric view of the cleaning head for the machine shown in Figure 1.

Figure 3 is a sectional view through the lower portion of a cleaning head showing one version of the present invention.

Figure 4 is a vertical section of the lower portion of a cleaning head showing another embodiment of the present invention.

Figure 5 is an enlarged cross-section through the fluid-applying element of the present invention as shown in Figure 4.

Figure 6 is a top plan view of a rotary cleaner which could incorporate the present invention.

Figure 7 is a vertical section through one of the cleaning heads in the device of Figure 6.

Figure 8 is an isometric representation of the cleaning head of Figures 6 and 7 further disclosing the present invention in its working environment.

Figure 9 is an alternate embodiment wherein the fluid delivery is adjacent the vacuum.

Figure 10 is yet another embodiment with the fluid delivery adjacent the vacuum.

#### Best Mode for Carrying Out the Invention

As seen in Figure 1, the cleaning system for the present invention includes a main receptacle 2 into which the soiled fluid is returned via vacuum hose 4 interconnected with nozzle 6. Mounted above the receptacle 2 is the vacuum motor and the supply of a cleaning material supplied via tube 10. It is to be understood that this cleaning system could be track-mounted.

As better seen in Figure 2, the carpet cleaning head 6 includes a rigid vacuum tube 12 and a rectangular, downwardly open truncated pyramidal envelope 14 which would contain the spray which is generally applied in prior known cleaning methods as well as forming the plenum for the vacuum returning the soiled liquid to the source.

As best shown in Figures 3, 4, 9 and 10 which are four separate embodiments, are the improved means for applying the cleaning fluid without the inherent problems of spray



escaping. The front and back of the cleaning heads are depicted as 16 and 18, which with the end panels (not shown) define the area of the floor to be cleaned, which is momentarily subjected to the cleaning environment. Securely  
 5 mounted (see Figure 3) to the interior of the cleaning head is a downwardly open fluid supply means having a first wall 20 terminating in a head 22 and a second wall 24 terminating in an inwardly turned foot 26. The cleaning fluid which is supplied in a steady stream downwardly between the walls 20  
 10 and 24 flows outwardly in a sheet past foot 26 and around head 22 to be applied uniformly to the carpet or other material, and then vacuumed up to the return tank. The utilization of a sheet of fluid which flows down the nozzle head eliminates the cooling of the fluid caused by transforming it from a solid  
 15 into droplets, reduces the amount of fluid being used for a particular job, and further eliminates the problem of overspray should the cleaning head be inadvertently moved from the surface or tilted so one edge is raised.

A second embodiment of the present invention is shown in Figure 4, wherein walls 16 and 18 can again be seen,  
 20 terminating adjacent the floor surface to be cleaned. Mounted between the two walls is a horizontal tube 28 having an angled slot 29 supplied by conduit 30 and mounted by means of brackets 32, 34 within the cleaning head.

Reference is now had to Figure 5, wherein the tube or manifold 28 is enlarged to show the slit or groove 29,  
 25 which is at an acute angle to the supporting floor or at an obtuse angle to the radius taken at the point of intersection with the circular cross-section. It is important to know at this point that the width of the slit 29 and the angle to the  
 30 floor are critical elements in the proper functioning of the present invention and the appropriate application of the cleaning fluid.

As seen in Figure 6, the present invention could be used in an alternate embodiment such as that taught by Monson  
 35 in U.S. Patent No. 4,441,229, wherein cleaning and vacuum heads 40 and 42 are mounted to a plurality of arms which are rotated about a hub 44.

Referring now to Figure 7, which is a vertical section through the cleaning head 40, it can be seen that the supply conduit 28 is securely mounted between the walls 16 and 18 by brackets 46, 48 and in contact with the floor surface or uniplanar with the bottom edges of the walls 16, 18.

Although the embodiment shown in Figures 6-8 depicts six arms, two of which dispense fluid, it is to be understood that other combinations could easily be used.

As seen in Figures 9 and 10, the fluid supply, since it is not sprayed, need not be contained in an envelope. In Figure 9, fluid flows downwardly between wall 50 which terminates in foot 52 and wall 54 which terminates in head 56, and forms a sheet flowing over head 56. The fluid is returned by vacuum between walls 54 and 58. The head shown in Figure 10 is of one piece, with the fluid exiting through angular slot 60, flowing along bottom surface 62, and being removed through vacuum opening 64.

Thus, as can be seen, the present invention provides a way to safely and efficiently clean carpeting and the like while reducing the heat loss of cleaning fluid used for a particular job, avoiding the problem of overspray, and, perhaps most importantly, to allow the carpet to be dried more quickly, since there is less penetration and therefore more fluid is extracted. It is further to be noted that the fact that fluid is not sprayed upon the carpet prevents it from driving the soil further into the nap.

Although a preferred embodiment of the invention has been disclosed herein for illustration, it should be understood that various changes, modifications and substitutions may be incorporated in such embodiment without departing from the spirit of the invention, which is defined by the claims as follows.

What is claimed is:

Claims

1. A cleaning head adapted to be used with a source of cleaning fluid, and a vacuum source for cleaning a floor, wall or upholstered surface; comprising:

a lower surface contact area defined by a rectangular lip defined by the main body of the head, outlining the limits of operation of the tool as it is guided over the floor;

fluid-applying means fixedly located within the confines of the lip, said fluid-applying means being configured such that the cleaning fluid is applied to the surface as a continuous film flowing over the lowermost surface, whereby fluid is better controlled, there is no danger of overspray, and the surface is dried more quickly;

means to interconnect the cleaning head and a source of cleaning fluid; and

means to interconnect the cleaning head and a vacuum source.

2. A floor, wall or upholstery cleaning tool for use in conjunction with a source of cleaning fluid and a vacuum source comprising:

means interconnecting the tool to the fluid sources;

exterior envelope means and interior supply means wherein the exterior envelope has a substantially uniplaner lower surface which means defines a substantially enclosed area of the floor when in contact therewith and is connected to the vacuum source and the supply means is interconnected with the source of cleaning fluid, provides an elongated bottom lip substantially uniplaner with the lower surface of the envelope and is configured such that the fluid is selectively applied to the floor as a thin film.

3. A tool as in claim 2, wherein the supply means is tabular and includes an elongated slot in its lower surface for delivering the cleaning fluid.

4. A tool as in claim 3, wherein the slot is at an acute angle to the plane formed by the lower surface of the exterior envelope so as to create a fluid attraction, moving fluid toward the vacuum source.

5. A tool as in claim 2, wherein the supply means comprises a downwardly open narrow slot substantially in the same plane as the bottom surface of the envelope, one side of which includes an inwardly projecting foot.

6. A cleaning head adapted to be used with a source of cleaning fluid and a vacuum source for cleaning a floor, wall or upholstered surface, comprising:

a lower surface contact area defined by a lip surrounding an opening through which a vacuum is applied for removing fluid and entrained soil; and

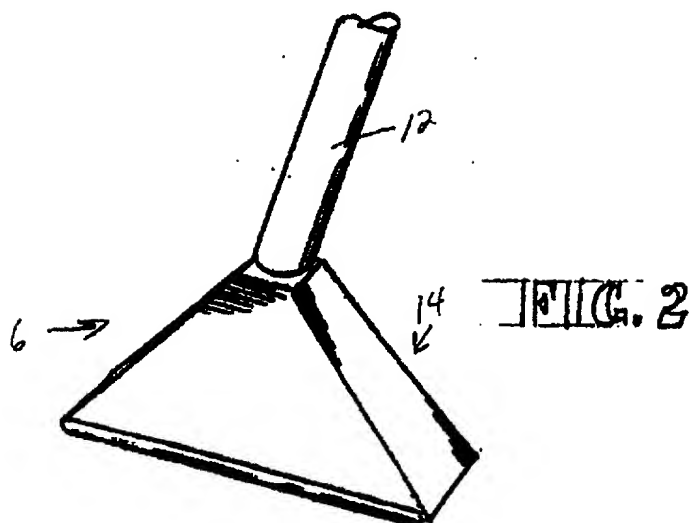
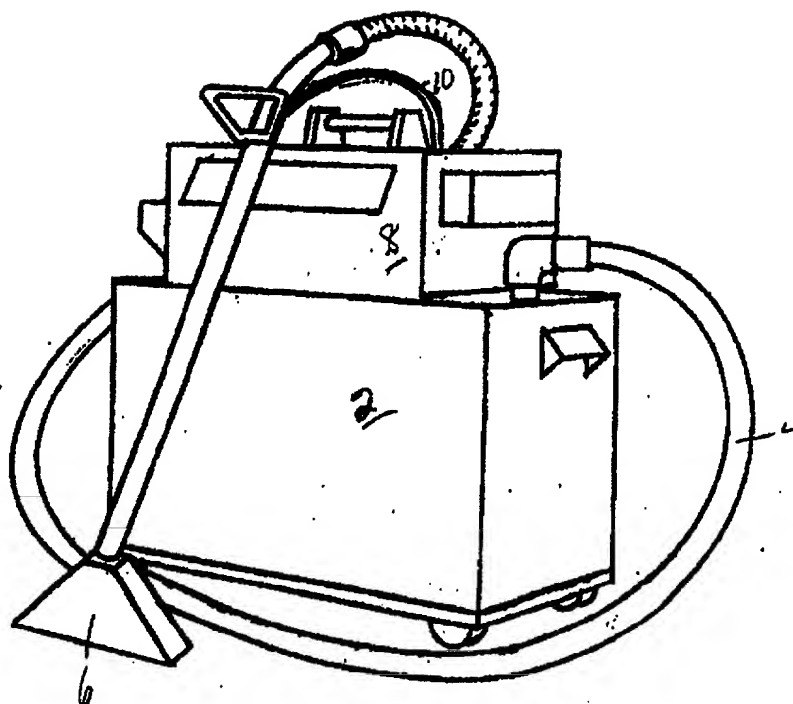
a fluid supply means adjacent the lip, including an angled delivery slot, causing the fluid to flow in a sheet over the lip and into the vacuum.

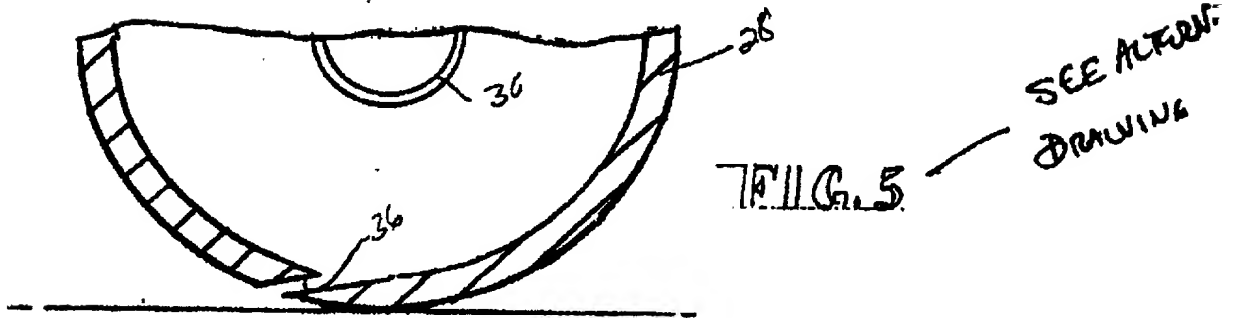
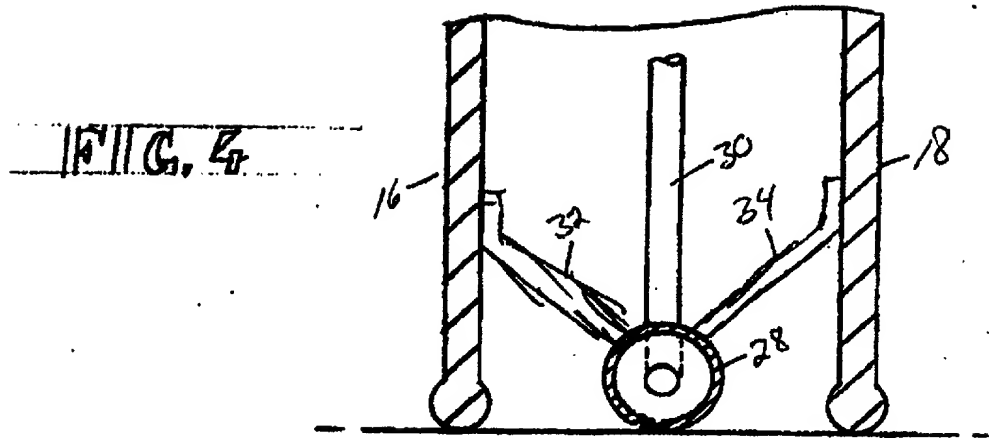
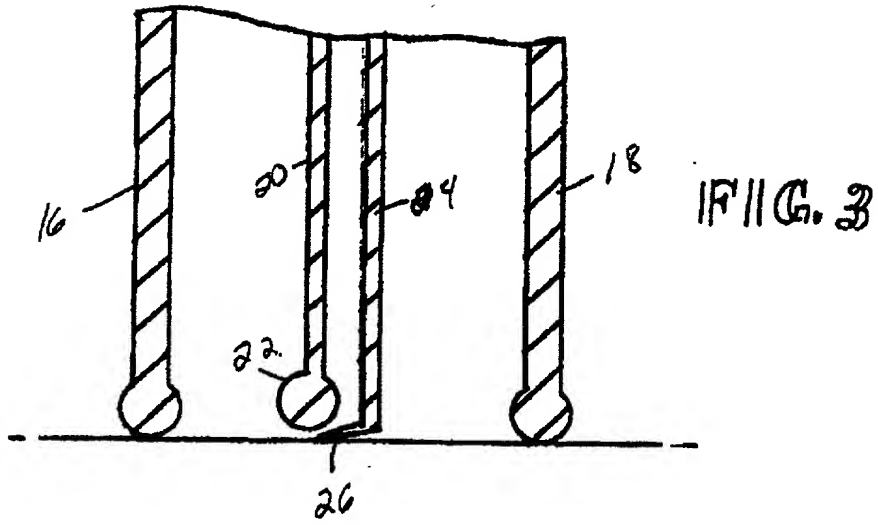
## Abstract

## SPRAYLESS SURFACE CLEANER

A cleaning head for carpets, walls or upholstery, including a rigid, exterior, open-bottomed main body which defines the surface subjected to the cleaning process. Mounted within or adjacent to the main body portion coplanar with the bottom thereof is the fluid-applying device, which includes a slot at an acute angle to the plane of the bottom of the body located adjacent the plane of the bottom of the body, configured such that the fluid is applied in a thin sheet which flows out of the slot and into the upper portion of the surface to be cleaned and subsequently into the vacuum source for recovery.

FIG. 1





SEE AFORE-  
DRAWING

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FIG. 6

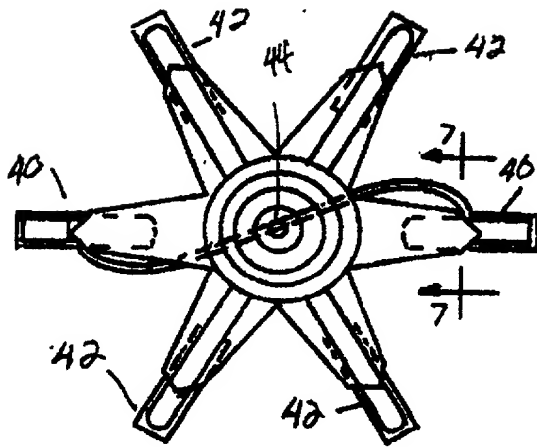


FIG. 7

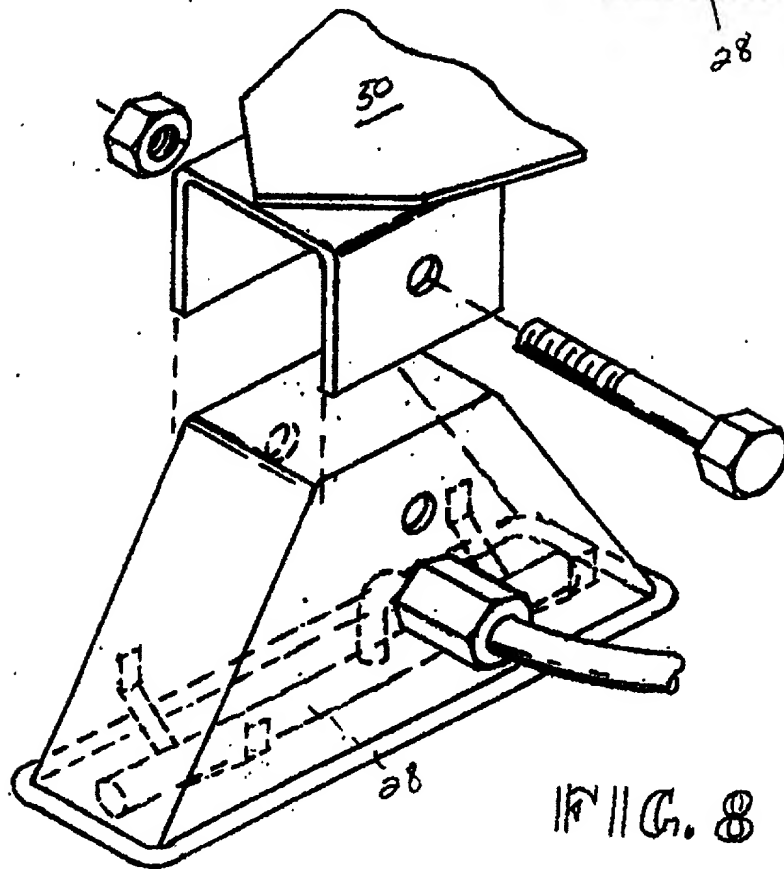
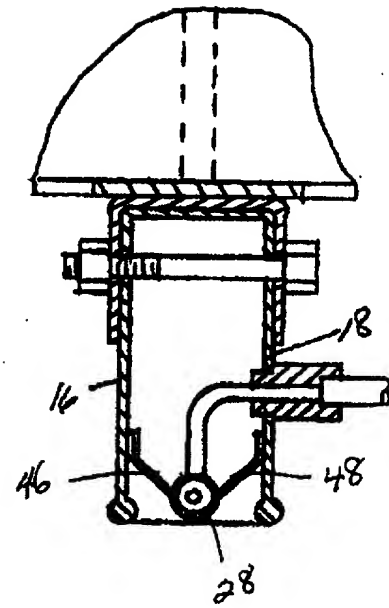
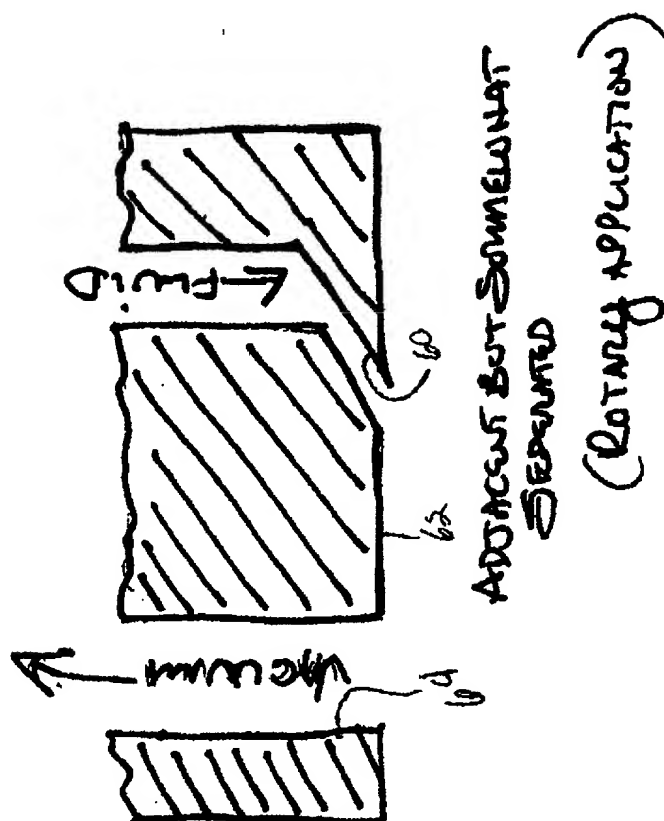


FIG. 8

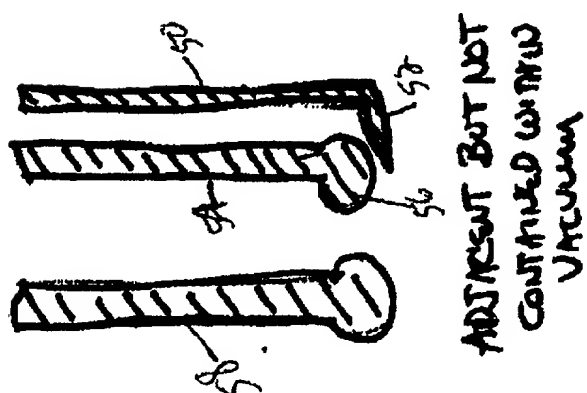
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TOTAL P. 21



7  
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DECLARATION AND POWER OF ATTORNEY

As the below-named inventor, I declare that:

My residence, post office address, and citizenship are as stated below under my name.

I have reviewed and understand the contents of the foregoing specification, including the claims, and I believe I am the original, first and sole inventor of the invention entitled "SPRAYLESS SURFACE CLEANER", which is described and claimed in the foregoing specification.

I acknowledge my duty to disclose information of which I am aware which is material to the examination of this application in accordance with 37 C.F.R. § 1.56(a).

I hereby appoint ROBERT A. JENSEN, Registration No. 24,268, CLARK A. PUNTIGAM, Registration No. 25,763 and CHRISTOPHER O. DUFFY, Registration No. 19,480, comprising the firm of JENSEN & PUNTIGAM, P.S., 1020 United Airlines Bldg., 2033 Sixth Avenue, Seattle, Washington 98121-2584, telephone (206) 448-3200 to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: Please address all correspondence and telephone calls to: Robert A. Jensen.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that the making of willfully false statements and the like is punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and may jeopardize the validity of any patent issuing from this patent application.

Roy D. Studebaker  
Roy Studebaker

Date 8-3-99

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